United Sates Patent and Trademark Office
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Applicants: Danyang Liu and Wuyang Liu
Application No.: 10/069,364
Art Unit: 2121
Examiner: Barnes, Crystal J

Dec 3, 2004

Sir,

Statement of the Substance of the Interview

This is my response to the Interview Summary signed by the Examiner and mailed to me on Nov 3, 2004.

I confirm that the "Advisory Action" dated Sep 22, 2004 provided me with the three options:

(1) a timely filed amendment which places the application in condition for allowance;
(2) a timely filed Notice of Appeal (with appeal fee); or
(3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114.

On Oct 26, 2004, Mr. Anthony Knight (the supervisor of the Examiner Ms. Crystal Barnes) phoned me and he and I and an extensive discussion on my response dated July 23, 2004 to the Office Action dated May 5, 2004. Attached is a copy of the letter dated Oct 28, 2004 that summaries this telephone interview.

I confirm that I had quite a few phone conversations with the Examiner Ms. Barnes. In the last conversation with her before November 2004 she told me that in my situation my best option was to file a continuation application, and she did not seem to like the options (1) and (3) mentioned above. She repeated the keyword "continuation" to me so that I could find information relating to this subject from USPTO's website. And I did visit this website to search information relating to the keywords "continuation application" and I found that "continuation-in-part" (CIP) application might be an even more appropriate option. That is why I filed CIP application and received an application No. 10/981500 for it.

Yours truly,

Danyang Liu, PhD
#108, 10615-111 Street
Edmonton, Alberta T5H 3G1
Tel: (780) 424-5074 **(not for receiving fax)**

Attachment: My letter to Mr. Anthony Knight and Ms Crystal Barnes sent by fax on Oct 28, 2004.

United Sates Patent and Trademark Office
Application No.: 10/069,364
Art Unit: 2121
Examiner: Barnes, Crystal J

Attention: Mr. Anthony Knight
Ms Crystal J. Barnes

October 28, 2004

Of the three options provided in your letter dated September 22, 2004, I would like to choose the first option, i.e., to file a further amended application. Your September 22 letter stated that my amendment filed July 23, 2004 raised new issues (see paragraphs 2 and 3 of your letter), and the claims did not avoid any of the rejections set forth in the previous Office Actions. On October 26, 2004 I talked to Mr. Knight and we went through my responses dated July 23, 2004 to the Office Action dated May 5, 2004 (hereafter "the OA").

1. Mr. Knight explained that the following equations in Claims 24 and 25 of my 2004-7-23 Amendment

   $u(k) = u(k-1) + K_1*r(k)*T + K_1*a(k,1) + K_2*a(k,2) + \ldots + K_p*a(k,p)$,
   $a(k,1) = [-y(k)]*T$, and $a(k, p) = [a(k,p-1) - a(k-1,p-1)] / T$ for p> or =2.

   were new issues or new matters. I told Mr. Knight that they were identical to the following equations in Claim 1 of my original application:

   $CO(k)=CO(k-1)+K1*SP(k)*T+K1*a(k,1)+K2*a(k,2)+- \ldots +Kj*a(k,j)$
   $a(k,1)=[-PV(k)]*T$, and $a(k,j)=[a(k,j-1)-a(k-1,j-1)]/T$ for j> or =2.

   except that I used new notation "u" to replace the old notation "CO" to represent the controller output, new notation "r" to replace the old notation "SP" to represent the set point, new notation "p" to replace the old notation "j", and new notation "y" to replace the old notation "PV" to represent the process variable. The old notations are mainly or only used in industry. The new notations are more popular in formal publications, especially in academia, because the old notations such as PV may easily mislead people to the interpretation of the product of P and V. It seems that Mr. Knight did not like the new notations and suggested me not to use new notations. I accept this and will go back to the old notations, so as to satisfy your requirements, unless you tell me this is unnecessary.

2. Mr. Knight's objection to my response to paragraph 3 of the OA is that I failed to supply a separate sheet showing my statement that all new matters referenced in the OA are cancelled and there are no more new matters in the amended application; otherwise I will be punished by law. I accept this and will provide such a statement.

3. Mr. Knight seemed to be satisfied with my response to paragraph 4 of the OA about the drawings, except that he pointed out that the fact that "minimax" is well-known prior art may be used to refuse my application. I will address this concern in paragraph 6 of this letter.

4. Mr. Knight seemed to be satisfied with my response to paragraph 5 of the OA about the layout of the application required by the OA.

5. Mr. Knight seemed to be satisfied with my response to paragraph 6 of the OA that my dependent claims now refer to other claims in the alternative only and comply with 37 CFR 1.75 (c), as required by the OA (I told Mr. Knight that Ms Barnes objected to my old dependent claims because they depended on two previous claims).

6. For my response to paragraphs 7, 8, and 9 of the OA, Mr. Knight's major concern seems to be: The fact that "minimax" is well-known prior art may be used to refuse my application. Please note that my invention can be stated as (see the section "Detailed description of the invention", or see Claims 22 and 23):

   "This invention chooses the best values for the tuning parameters in a PID controller or a linear controller in such a way that the largest absolute value of all poles of said discrete-time closed-loop transfer function from said set-point r(k) to said process variable y(k) is minimized subject to, if any, user-specified constraints on one or more of the tuning parameters."

   When carrying out the above invention, an optimization algorithm such as "minimax" algorithm is needed. The following are obvious:

   a) "Minimax" is well-known prior art to an engineer skilled in designing controller (see the many cited references on "minimax") and therefore we do not need to teach this prior art in this patent application;
   b) However, knowing "minimax" **alone** does not mean knowing how to design a controller that is optimal in a way described in the present invention, unless this invention is disclosed to the engineer.
   c) **Only after** the invention is disclosed to a controller designer, might he say: "That is easy. I know how to implement this invention." He will probably purchase the "minimax" program in the "Optimization Toolbox" (prior art) developed by The MathWorks Inc to carry out the invention;
   d) Therefore, the fact that "minimax" is well-known prior art cannot be used to refuse my application.

   For example, mathematicians all know "minimax" very well (see the cited references on various minimax algorithms developed by them), but none of them knows the way of designing an optimal controller as described in the present invention, unless this invention is disclosed to them.

   Consider this similar example: If an inventor invented a wooden chair that can cure backpain (backache). To carry out this invention a carpenter must know how a saw works and how to use a saw to cut woods into different shapes. The following are obvious:

   e) How a saw works or how to use a saw to cut woods into different shapes are prior art to a skilled carpenter and therefore the inventor does not need to teach this prior art in his patent application;
   f) However, knowing how a saw works or how to use a saw to cut woods into different shapes **alone** does not mean knowing how to make such a specific chair, unless the invention is disclosed to the carpenter.
   g) **Only after** the invention is disclosed to a carpenter, might he say: "That is easy. I know how to implement this invention." He will probably purchase saws or other tools (prior art) from Wal-Mart Ltd to carry out the invention;
   h) Therefore, the fact that how a saw works or how to use a saw to cut woods into different shapes are well-known prior art cannot be used to refuse the inventor's patent application.

This easy-to-understand example further supports the above conclusions a), b), c) and d).

7. There is no discussion on my response to paragraph 10 of the OA. But apparently you will be satisfied with this response since the amended specification now relies on the cited references and therefore complies with paragraph 10 of the OA.

8. I also discussed with Mr. Knight whether the subject-matter of this invention is patentable or not. The US patents 4,754,391 with the title "Method of determining PID parameters and an automatic tuning controller using the method" and US Patent 5,229,699 with the title "Method and an apparatus for PID controller tuning" directly support the patentability of the present invention. A search of the US patent database with both "controller" and "tuning" in the title gives 40 granted patents on this subject matter. Mr. Knight accepted the patentability of the subject-matter of this invention.

The above is my summary of my discussion with Mr. Knight on Oct 26, 2004. If I missed any thing, or if you have any further comments, suggestions, objections, or whatever, please kindly let me know. I can phone you at any time that is convenient to you. I wish you would show me **all detailed specific** reasons why you are unhappy with my application. I will then amend it to avoid your objections or give explanations if necessary.

If after this we find that I only need to make minor amendments, such as the notation problem as discussed in paragraph 1 of this letter, then I wish you would consider my difficult situation as described in the two letters I faxed to Ms Barnes on Oct 25 and allow my application with minor amendments.

Yours truly,

Danyang Liu, PhD
#108, 10615-111 Street, Edmonton, Alberta T5H 3G1, Tel: (780) 424-5074 **(not for receiving fax)**